



1



## Diagnosis and Baseline Establishment

# WASTE CHARACTERIZATION ACCORDING TO THE WASTE WISE CITIES TOOL

A PRODUCT DEVELOPED WITHIN THE FRAMEWORK OF:



On behalf of:



Federal Ministry  
for the Environment, Nature Conservation,  
Nuclear Safety and Consumer Protection

of the Federal Republic of Germany



## ABOUT THE PROMAR PROJECT

The PROMAR - Prevention of Marine Litter in the Caribbean Sea project aims to reduce the flow of plastic waste (mainly plastic packaging and single-use plastics) reaching the Caribbean Sea by promoting circular economy solutions in eight Caribbean countries. The project is funded by the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) and led by the German organization adelphi.

Within the framework of the project, the PROMAR BlueBox was created, a collection of various tools, guidelines, tutorials and materials that will help you implement circular economy solutions to reduce marine litter in your municipality. The short fact sheet that you will find on the following pages is included in the PROMAR BlueBox as an introduction and recommendation to the Waste Wise Cities Tool (WaCT) developed by the United Nations Human Settlements Program (UN-Habitat).

The objective of the tool within the BlueBox is to guide users in the process of obtaining **primary data about waste generation** on household level, more precisely the **household waste generation rate per capita and a household waste composition analysis**. Furthermore, it provides the instructions to determine **the composition of waste at disposal facilities**.

The Waste Wise Cities Tool is aimed at local authorities like municipalities or city representatives, development agencies, NGOs or other parties involved in solid waste management. The publication of this tool is expected to encourage its use in (coastal) communities and thereby contribute to a better understanding of and subsequently the reduction of land-based waste streams such as plastic waste that reach marine environments,

# INTRODUCTION

The complete Waste Wise Cities Tool (WaCT) guides readers through 7 steps to collect data on municipal solid waste (MSW), how it is generated, collected, and managed in a municipality. The tool is intended as a step-by-step guide to assess a city's municipal solid waste management performance through the UN sustainable development goals (SDG) indicator 11.6.1., with which it is aligned.

The tool includes:

- preparation phase (step 1)
- a methodology for household MSW generation and composition (step 2)
- subsequently also for non-household MSW generation (step 3)
- step 4 and 5 include the analysis methodologies for MSW received by recovery and disposal facilities.
- step 6 focuses on the waste composition at disposal facilities
- step 7 is about calculating food waste, recycling, plastic leakage, greenhouse gas emissions and air pollution.



However, not all of the extensive WaCT steps will be needed for this BlueBox tool. We focus on Step 2: household waste generation rate and composition and Step 6: landfill waste characterization.

[Click here to access the guide that only includes the two relevant steps!](#)

# When should the tool be used?

The BlueBox contains the tool Waste Flow Diagram (WFD). It belongs to the first phase of the toolbox, the Diagnosis and Baseline Establishment.

It is used to estimate the amounts of plastic leakage into the environment, to monitor the effectiveness of applied waste interventions and to assist in informed decision making in MSW management planning. Conclusions from WFD application will be essential for defining and focusing the preventive actions within your municipality or community.

In order to conduct the assessment of a MSW management system, **primary data is needed**.



**[Click here to access the Waste Flow Diagram Tool in the BlueBox!](#)**

If you do not have the data that you need to enter into the WFD, if it is older than five years, or you don't trust the existing data, it is necessary to **conduct primary data collection**.

In this case it is recommend to use a data gathering methodology following the sustainable development goal 11.6.1. The UN-Habitat's Waste Wise City Tool uses this methodology and is harmonized with the WFD. This primarily concerns collecting data on the volume and composition of household waste, as well as the composition of waste at disposal facilities. If you want a more detailed analysis to supplement this, you can also determine the segmentation of waste in the municipality that does not originate from households, taking into account sources such as hotels, markets, schools, restaurants, offices or public places.

The Wise Cities Tool will help to collect the aforementioned data, however it will not serve to collect all the information needed for the WFD. For some (e.g. waste collected by the informal service chain), it will be necessary to conduct interviews on site or carry out observations.

# Application within the PROMAR project

The findings from the Waste Characterization analysis add to a strong foundation of evidence that will guide the formulation of strategies and policies in the field of the circular economy for the respective municipality. The acquired data can be used by local and national authorities to shape their waste management policies, like supporting the planning and development of municipal solid waste source sorting systems. Of course, it also forms the data basis for the material flow analyses which then provide information on how much waste is released into the environment.

As part of the PROMAR project, material flow analyses based on the Waste Wise Cities Tool and Waste Flow Diagram were carried out in 3 different municipalities in Costa Rica, Colombia and the Dominican Republic. This was done at the beginning of the project and served to obtain data-based knowledge of how much waste is generated, which fractions dominate, how much ends up in landfills and how much waste leaks into the environment. You can find the reports in Spanish here:



Fig. 2: Waste characterization at landfill, Dominican Republic

- [Report for Santo Domingo Este, Dominican Republic](#)
- [Report for Cieneguita, Costa Rica](#)
- [Report for Santa Marta, Colombia](#)

## NOTE!

Several methodologies already exist in other countries, such as the official method used in Costa Rica. We refer here to the official UN method, as it has proven to be the most comprehensive, best didactically guided and can best be used in conjunction with the Waste Flow Diagram.

# Overview of the procedure following the WaCT

The aim is to conduct an analysis about the household waste generation rate per capita, a household waste composition analysis and a landfill waste characterization.

Table 1 and the two following pages provides a summarized overview of the steps necessary to perform the analysis using the methodology.

[Click here to get to the short guide, including step 1, 2 & 6.](#)



[Click here to get to the full Waste Wise Cities Methodology.](#)

<p><b>Time frame</b></p>	<p>8 days (waste must be obtained daily throughout an entire week, including the weekend)</p>
<p><b>Sample size</b></p>	<p>90 households (10 households from 3 survey areas from high, middle- and low-income groups each) for average cities and 150 households (10 households from 5 survey areas in high, middle- and low-income groups each) for megacities.</p>
<p><b>Average per capita household waste generation rate</b></p>	<ul style="list-style-type: none"> <li>• Discard the sample from Day 1, as people tend to put waste in the bag which has been accumulating at their home, making the sample not representative.</li> <li>• Second, take the sum of the results from the other 7 days and divide it by the number of days and the number of people residing in the household.</li> <li>• Add population data for each income group: multiplying the calculated per capita household waste generation per income level, by the population of each income level (high, medium, low/informal settlements). All these are summed up to calculate the total household waste generation.</li> </ul>

Table 1. Overview of steps

# Overview of the procedure based on the WaCT

## Household waste composition analysis

**1.** Weigh the collected bags from each household (for each day) separately and record the weight in the sheet (Annex 2). Weigh an empty bag and deduct the weight of the bag from each sample weight. Remember, there is no need to weigh the bags from day 1, and these should already have been set aside



**2.** Prepare the buckets labelled with the 12 sorting categories around the thick plastic sheet. 1. Kitchen/canteen, 2. Garden/park, 3. Paper & cardboard 4. Plastic – film 5. Plastic – dense 6. Metals 7. Glass 8. Textiles/shoes 9. Wood (processed) 10. Special wastes 11. Composite products 12. Other

**3.** After making sure that the individual sample weights per household per day have been recorded, open the bags and spread the waste on the plastic sheet. You can mix the samples together at this point, as the composition is an average for the whole sample (i.e. not per household per day).

**4.** Sort the waste into the 12 categories. Annex 4 of the WaCT contains a sorting guideline.

**5.** Weigh each fraction and record it in the sheet. Remember to subtract the weight of the empty container from the total weight

**6.** Repeat the procedure every day of the week the duration of the sampling.

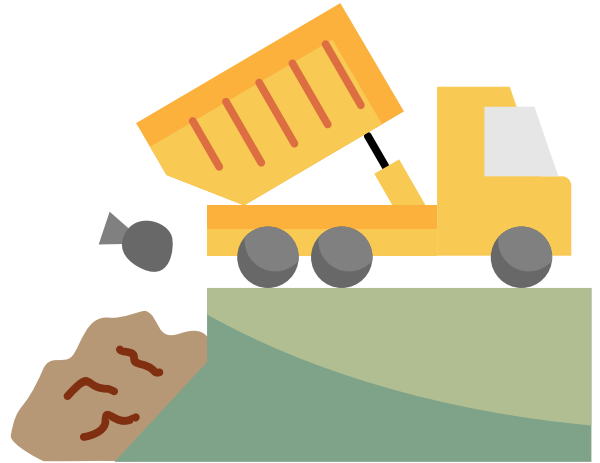
**7.** Calculate the composition average for the 7 days.



# Overview of the procedure based on the WaCT

## Landfill waste characterization

**1.** For this assessment a minimum of 3 trucks per income level (low, medium and high) service areas (or correspondingly from different household-type service areas) needs to be sampled.



**2.** Before selecting a truck for sampling, check with the truck drivers (or the disposal facility manager) from which area the truck is delivering the waste. Make sure only trucks containing purely MSW are sampled. Take a 200-300kg sample from the truck. Direct the driver to safely park alongside the tarpaulin. Deposit (either through hydraulic or manual unloading) the sample on top of the tarpaulin. Be extremely careful to ensure that the truck emptying process is safely completed, and that no one is in proximity to the falling waste as it is being unloaded.

**3.** Once you accumulated the MSW sample of 200-300 kg you need to derive a representative sample of around 50-70 kg for the analysis. The most commonly used technique for this is called “The Quartering Technique”:

- First mix the waste sample as thoroughly as possible with shovels
- Then spread out the waste on the surface so that it forms a flat layer.
- Divide the waste layer into four parts
- From those four portions, discard two opposing quarters
- Mix the remaining two quarters.
- Repeat the quartering process once more. The derived sample will be approximately one quarter of the size of the original sample, around 50-70 kg.

**4.** Prepare labelled containers and sort the sample of 50-70 kg into 12 categories in the respective container (1. Kitchen/canteen, 2. Garden/park, 3. Paper & cardboard 4. Plastic – film 5. Plastic – dense 6. Metals 7. Glass 8. Textiles/shoes 9. Wood (processed) 10. Special wastes 11. Composite products 12. Other)

**5.** Weigh each fraction in their containers and record the weight. Remember to subtract the weight of the empty container from your results.



# BLUE BOX

A PRODUCT DEVELOPED WITHIN THE FRAMEWORK OF:



On behalf of:



of the Federal Republic of Germany

